National Science Foundation
FY 2014 Budget Rollout
Directorate for Mathematical and Physical Sciences

April 10, 2013

F. Fleming Crim
Assistant Director
Mathematical and Physical Sciences

Directorate for Mathematical and Physical Sciences (MPS)

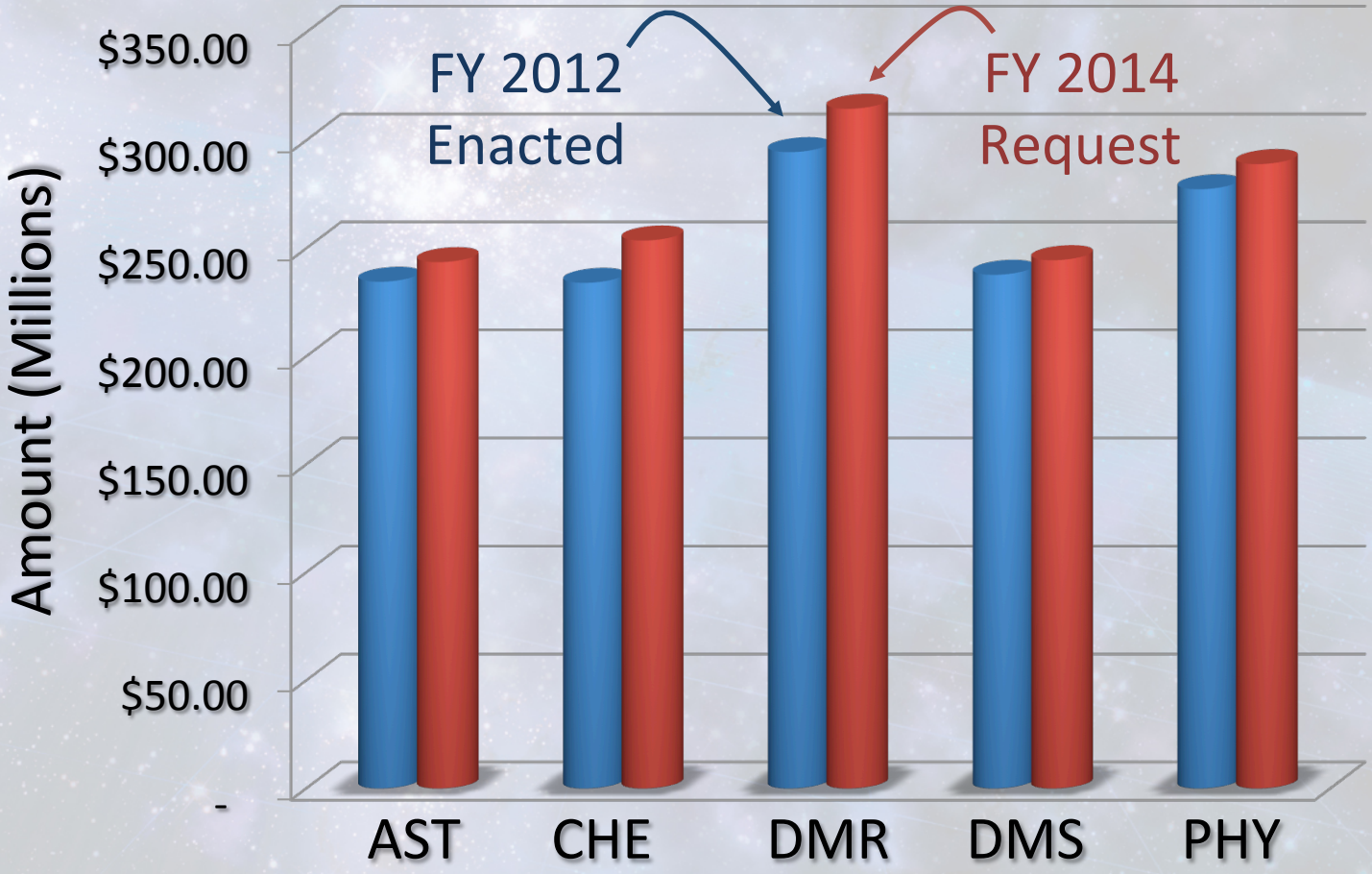
NSF Strategic Goals

- Transform the Scientific Frontiers
- Innovate for Society
- Perform as a Model Organization

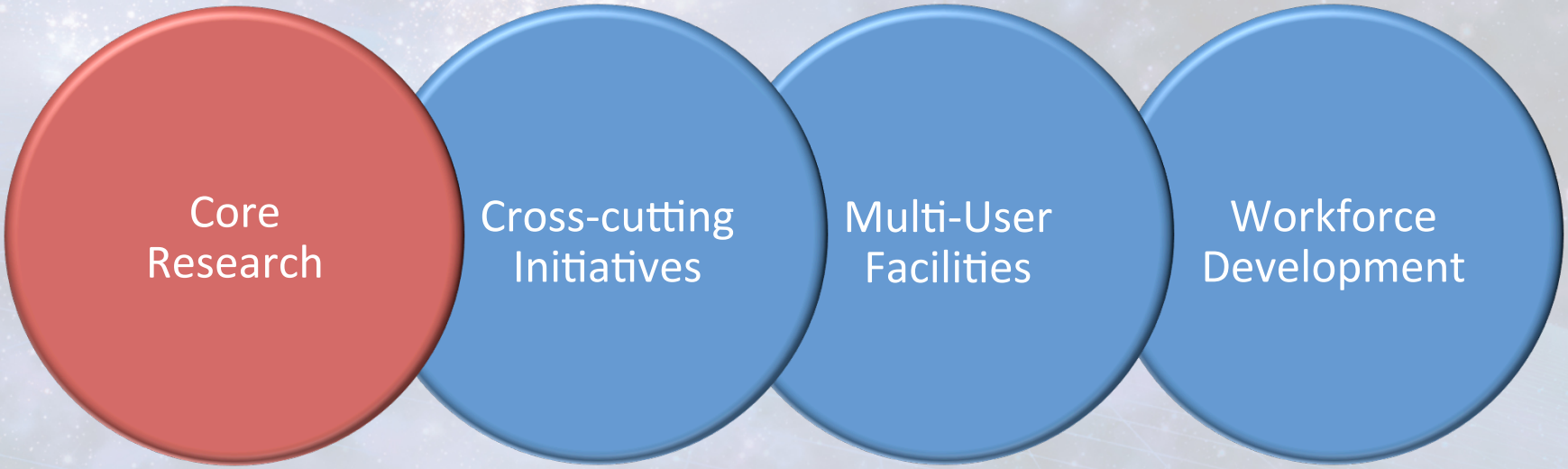
- Advancing Discovery
- Building Blocks for Innovation
- Forefront Facilities
- Educating the Next Generation

MPS FY 2014 Budget Request

$ 1309 M → $ 1386 M 5.9% ↑

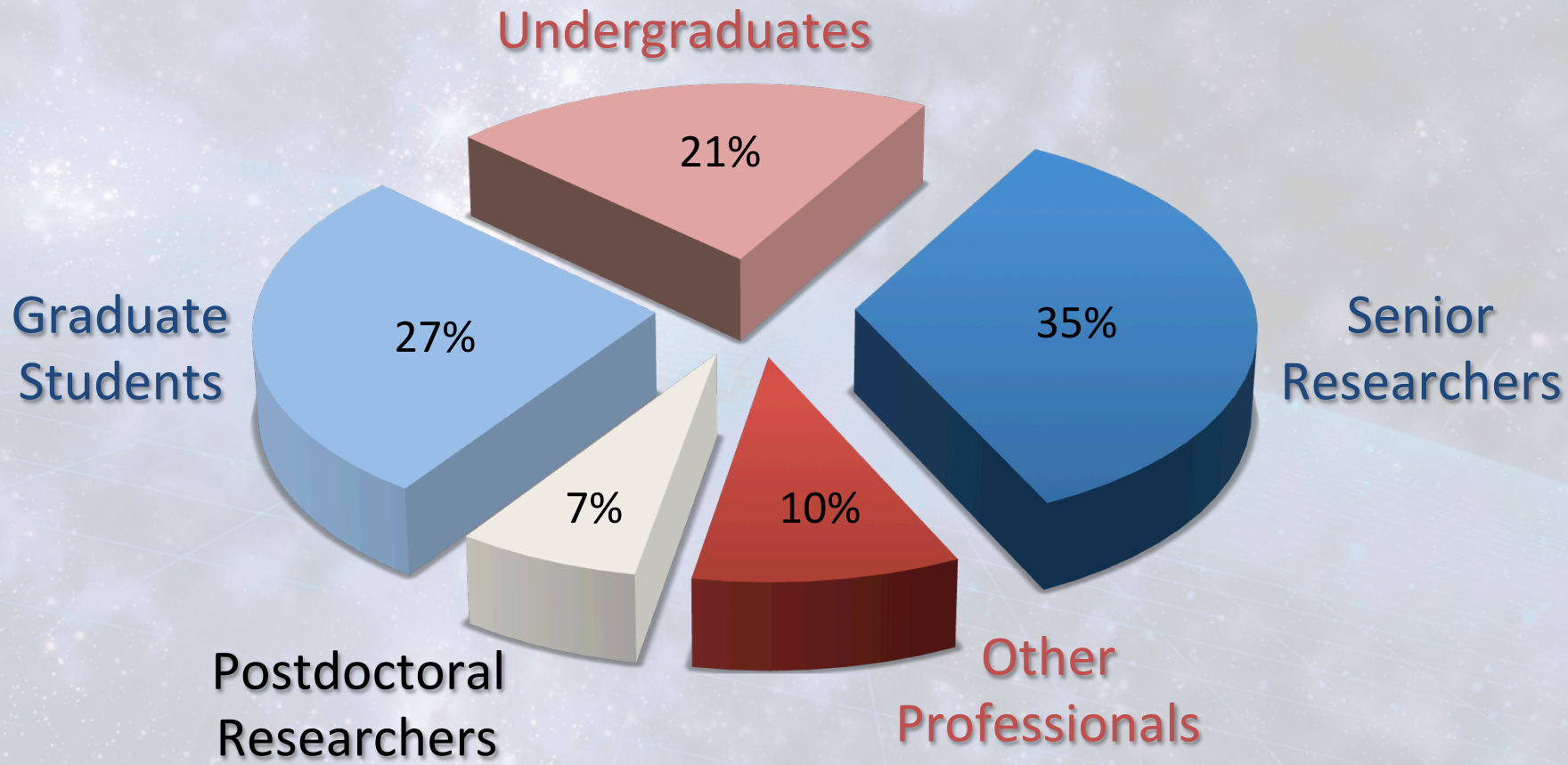


Directorate for Mathematical and Physical Sciences (MPS)



Core Research

33,000 People in MPS Activities*



*Estimated for FY 2014

The Excitement of Advancing Discovery

…extending our view of galaxy formation nearly to the Big Bang…

National Medal of Science
Sandra Faber (AST)

MPS supported 8 of 12 recipients of the National Medal of Science

Bard
Faber
Gates
Golomb
Goodenough
Hawthorne
Hood
Mazur

National Medal of Science
Barry Mazur (DMS)

…differential topology, number theory, and arithmetic algebraic geometry…

Core Research

The Excitement of Advancing Discovery

…extending our view of galaxy formation nearly to the Big Bang…

National Medal of Science
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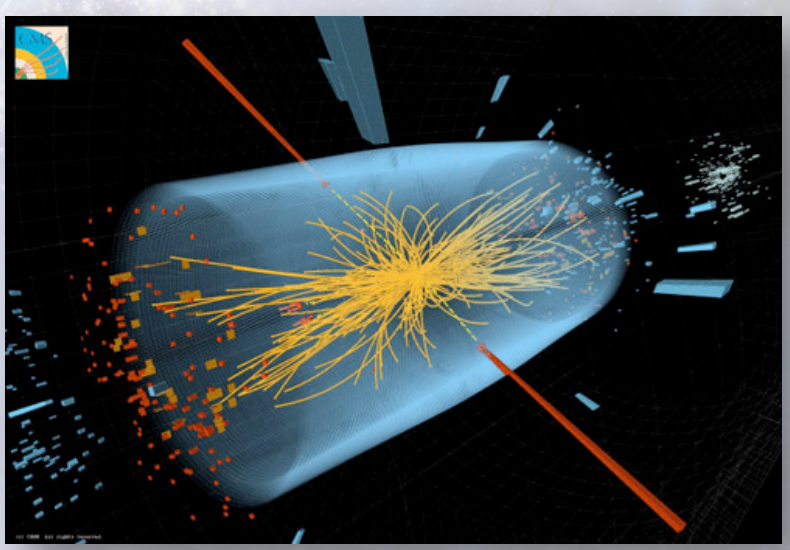
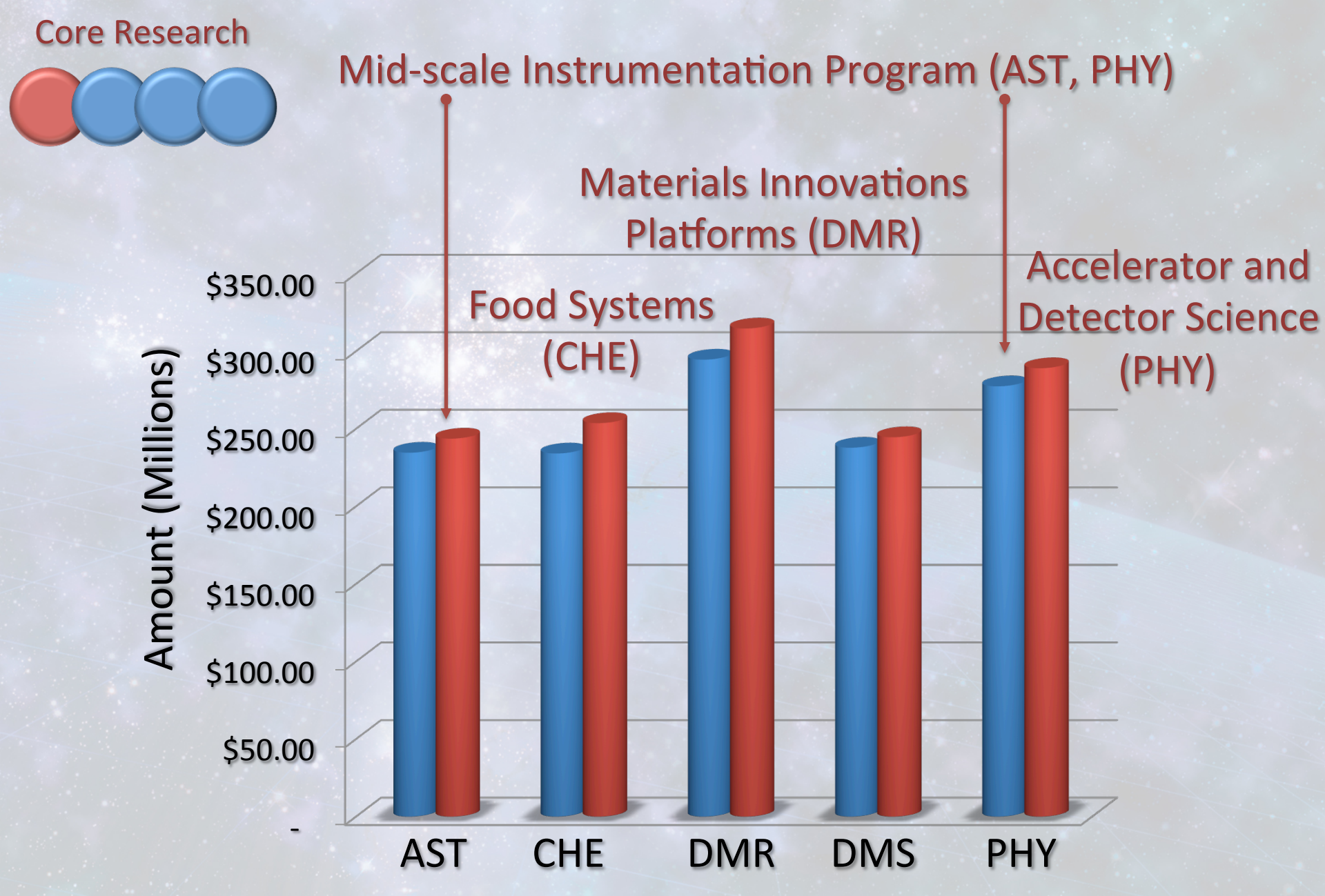


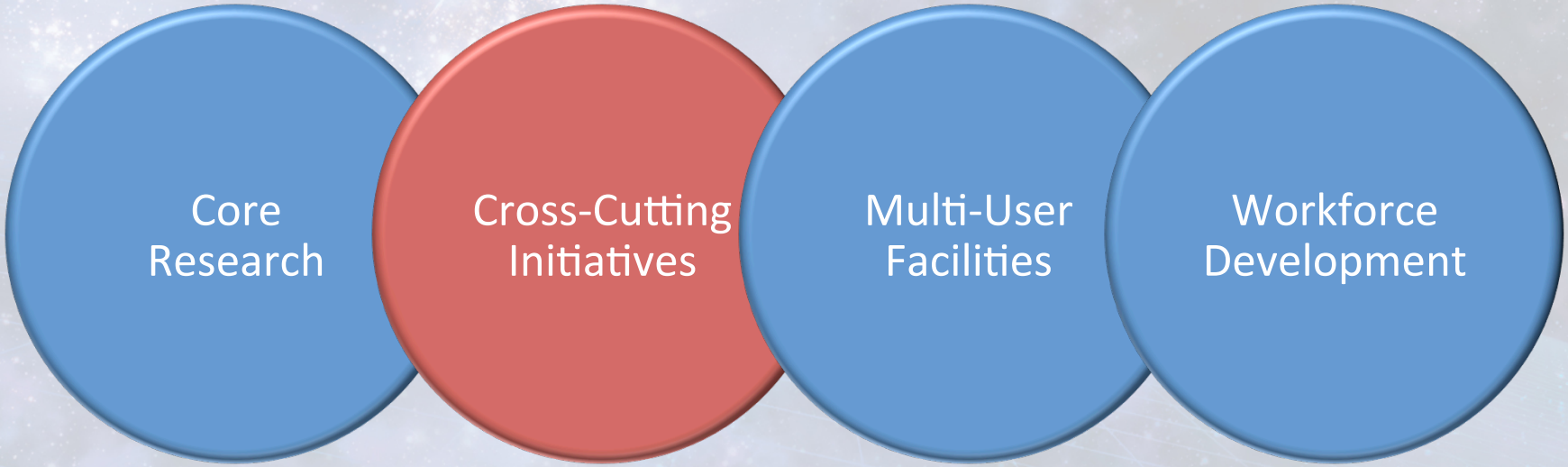
The Higgs Particle in the CMS detector at the LHC

…differential topology, number theory, and arithmetic algebraic geometry…

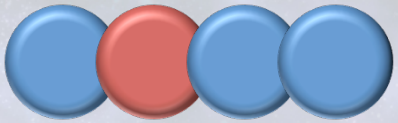
Core Research



Directorate for Mathematical and Physical Sciences (MPS)

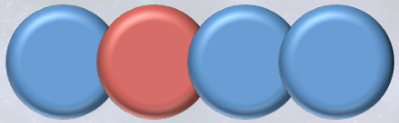


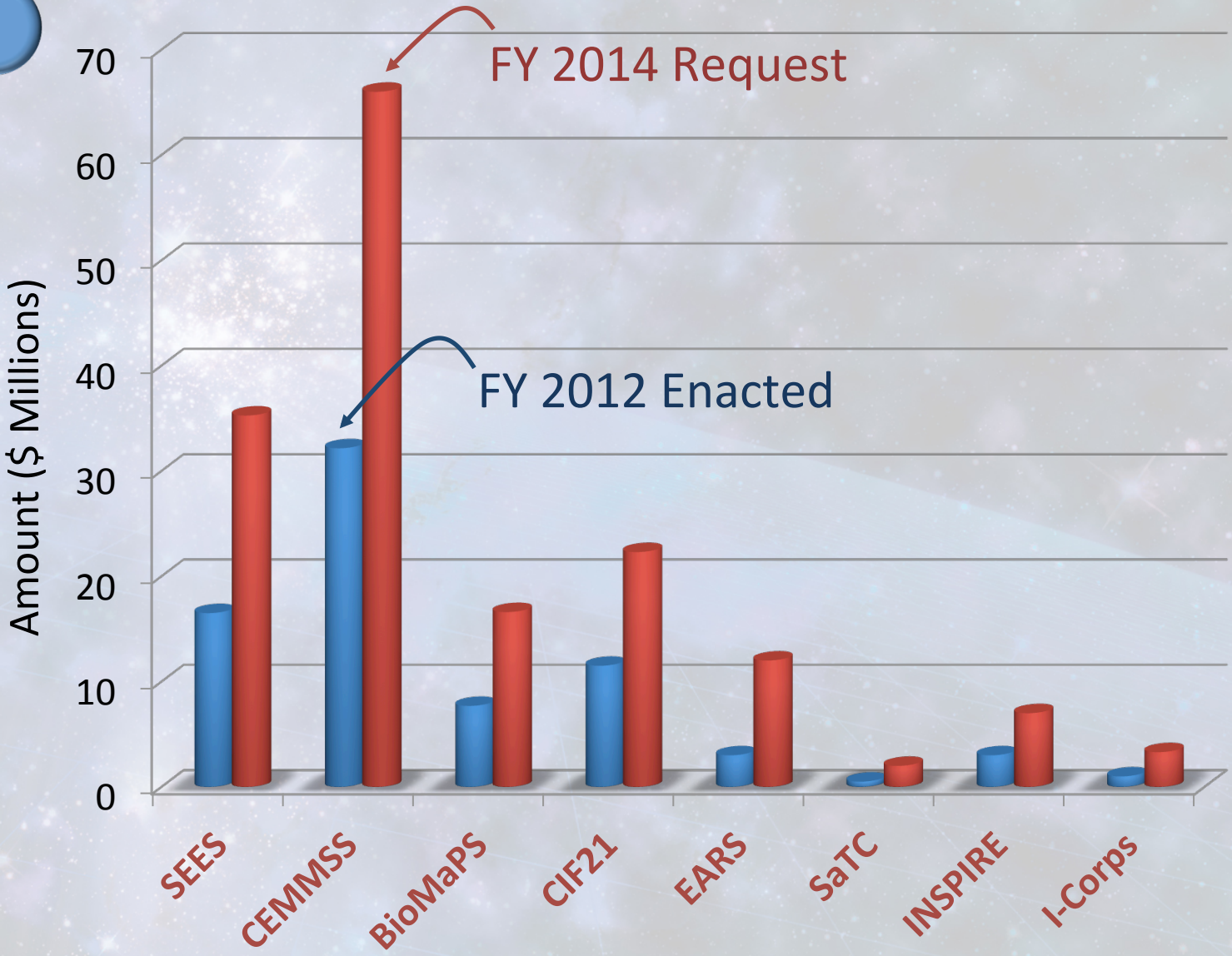
Cross-cutting Initiatives



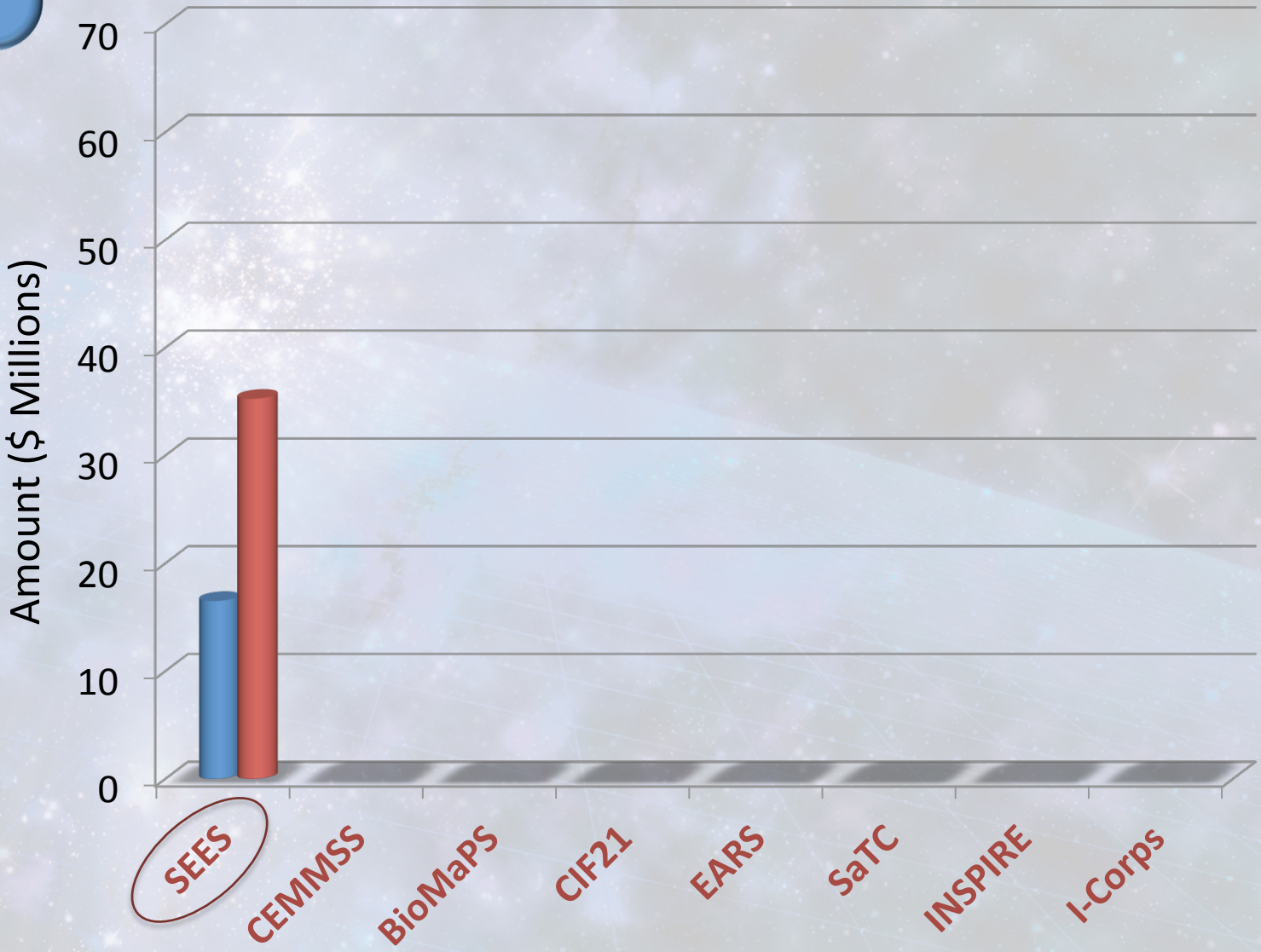
- Science, Engineering, and Education for Sustainability (SEES)
- Cyber-Enabled Materials, Manufacturing, and Smart Systems (CEMMSS)
- Research at the Intersection of Physical and Life Sciences (BioMaPS, BRAIN)
- Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21)
- Enhancing Access to the Radio Spectrum (EARS)
- Secure and Trustworthy Cyberspace (SaTC)
- Multidisciplinary Research Across NSF (I-Corps, INSPIRE)

Cross-cutting Initiatives





Cross-cutting Initiatives



Science, Engineering, and Education for Sustainability (SEES)

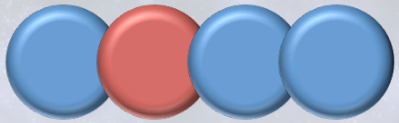
- Sustainable Chemistry, Engineering, and Materials Program (SusChEM)
  Critical Elements, Minerals, Materials
- Partnership of MPS with Directorate for Engineering (ENG)

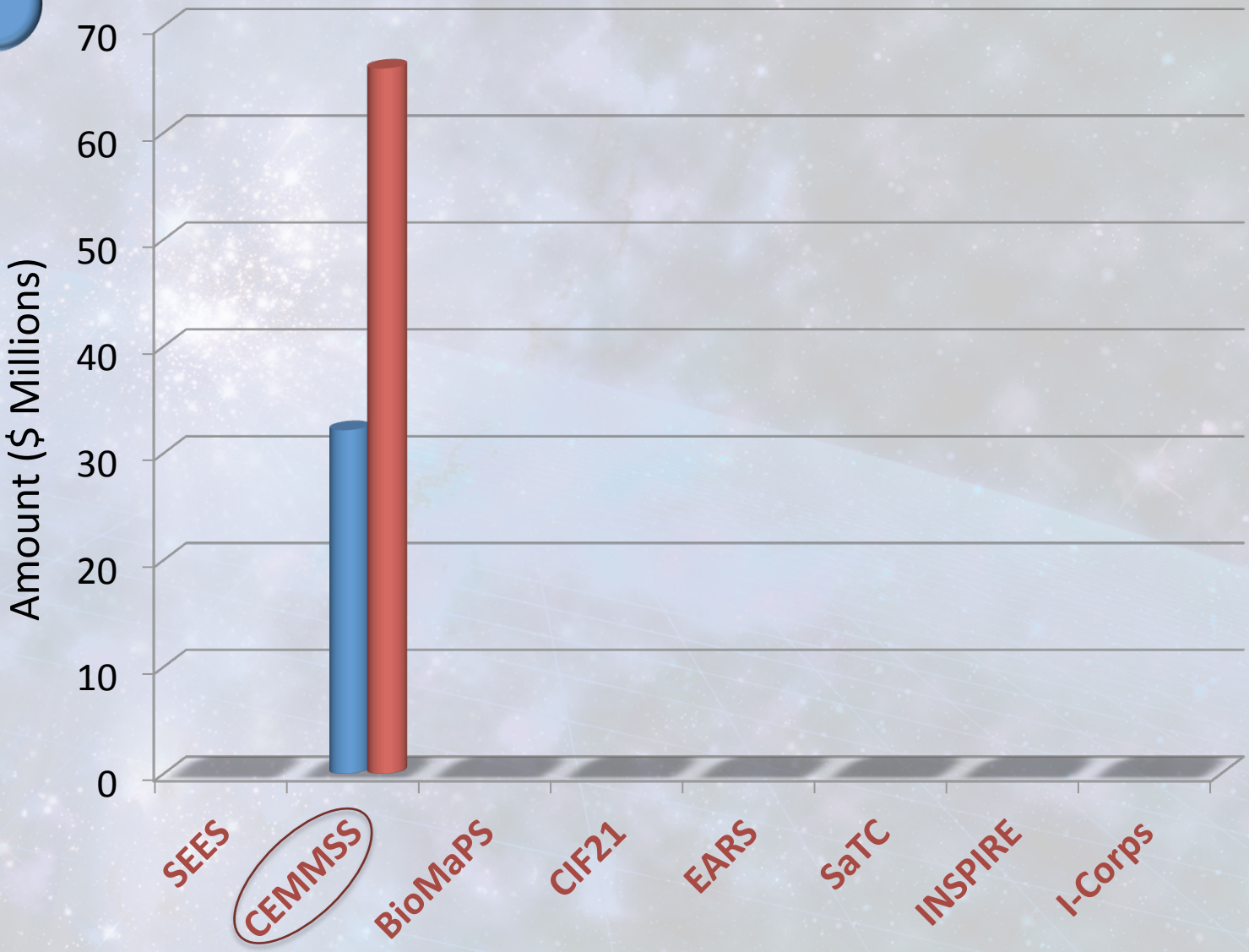
$ 35 M

106%

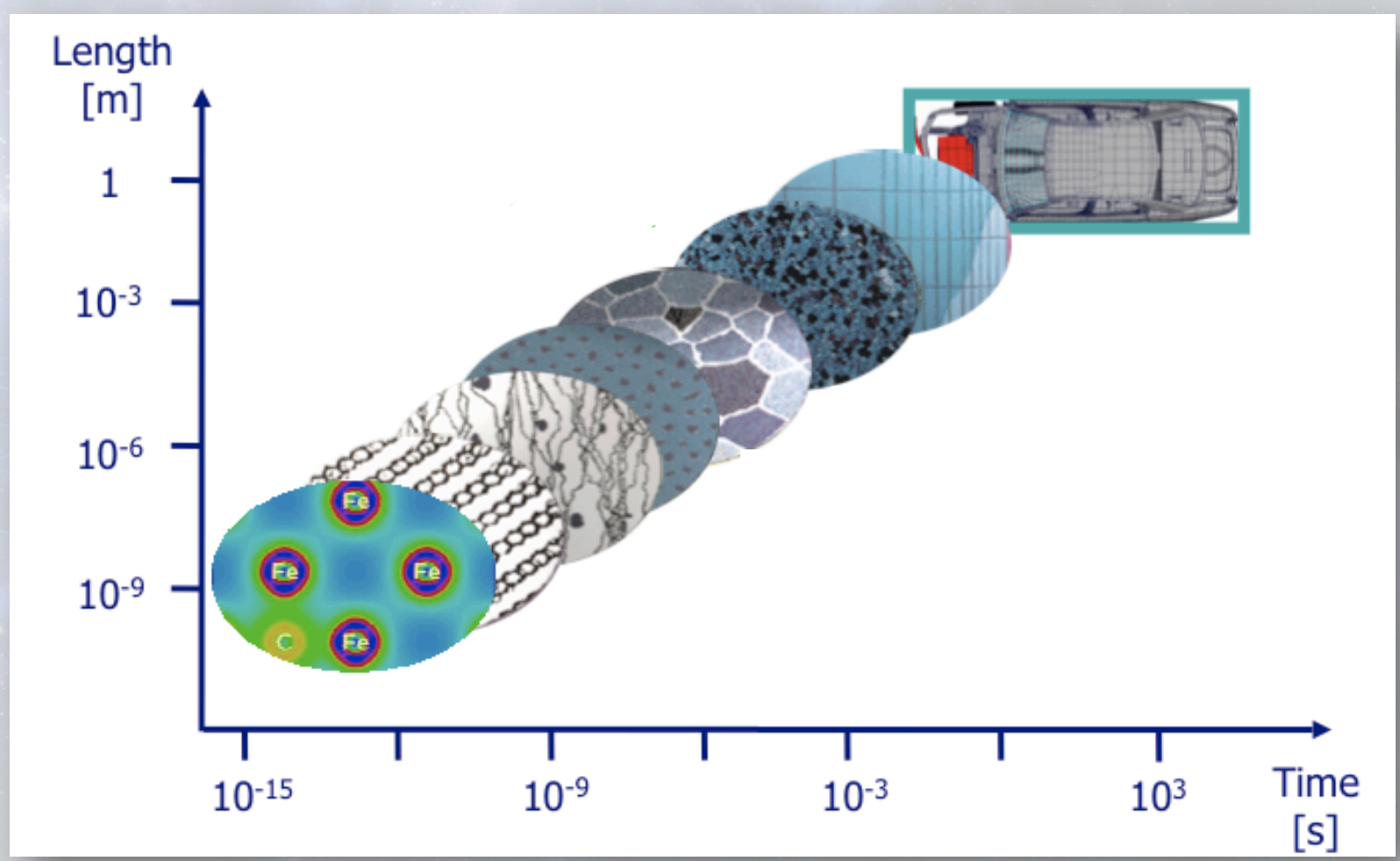
$ 17 M

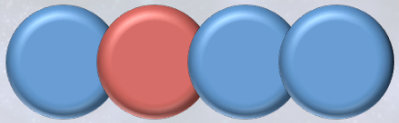
Cross-cutting Initiatives





Cyber-Enabled Materials, Manufacturing, and Smart Systems (CEMMSS)





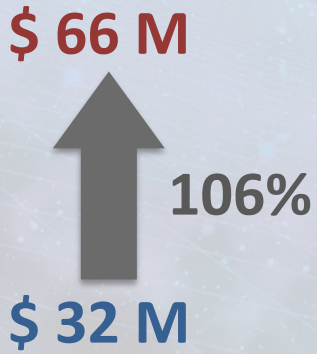
Cyber-Enabled Materials, Manufacturing, and Smart Systems (CEMMSS)

Designing Materials to Revolutionize and Engineer our Future (DMREF)

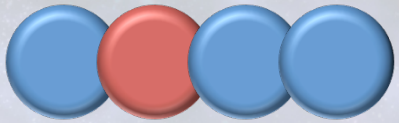
(NSF support of multiagency Materials Genome Initiative)

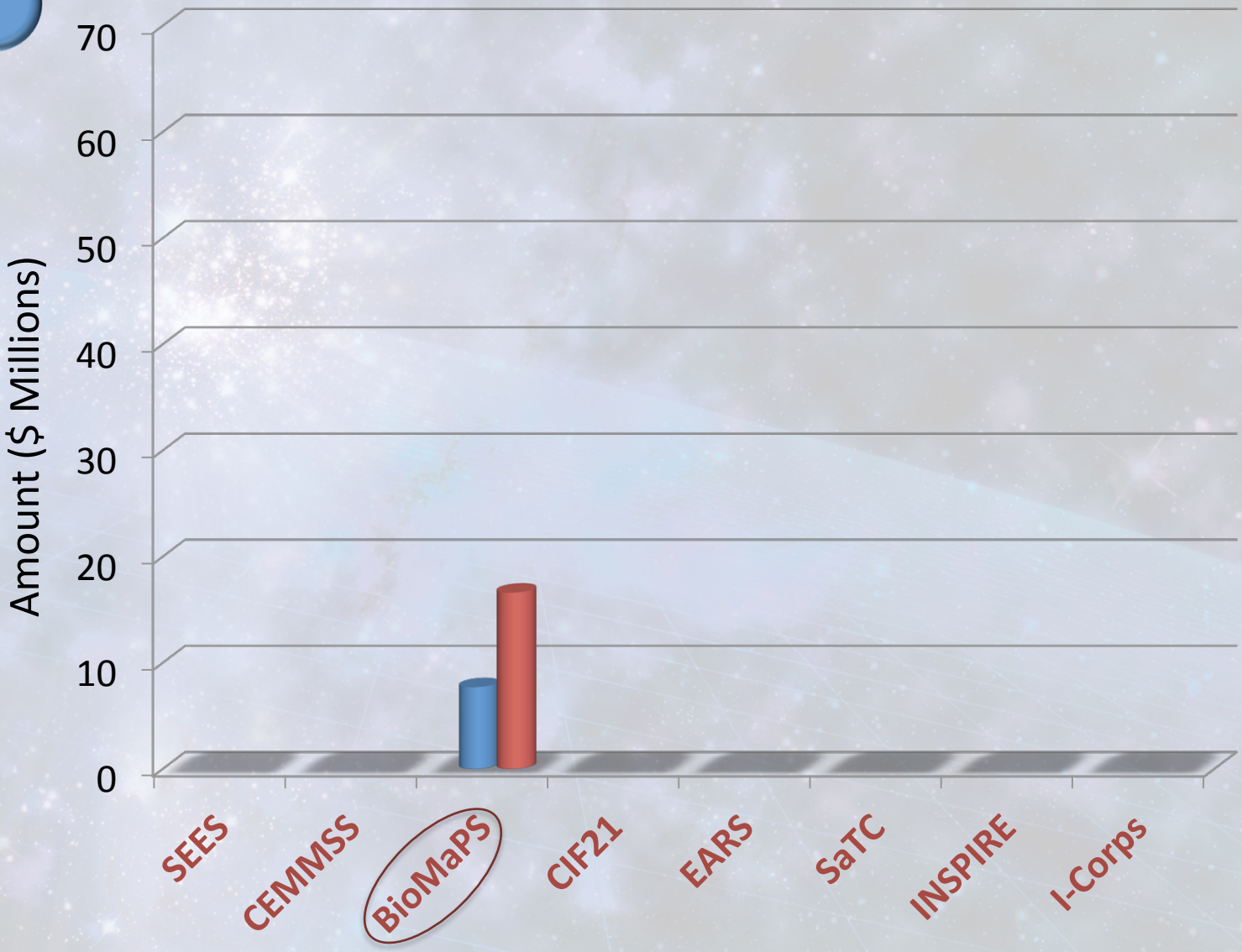
- Design and synthesize materials by integrating theory, computation, experiment, and data mining

- Partnership of MPS with Directorates for Engineering (ENG) and Computer and Information Science and Engineering (CISE)



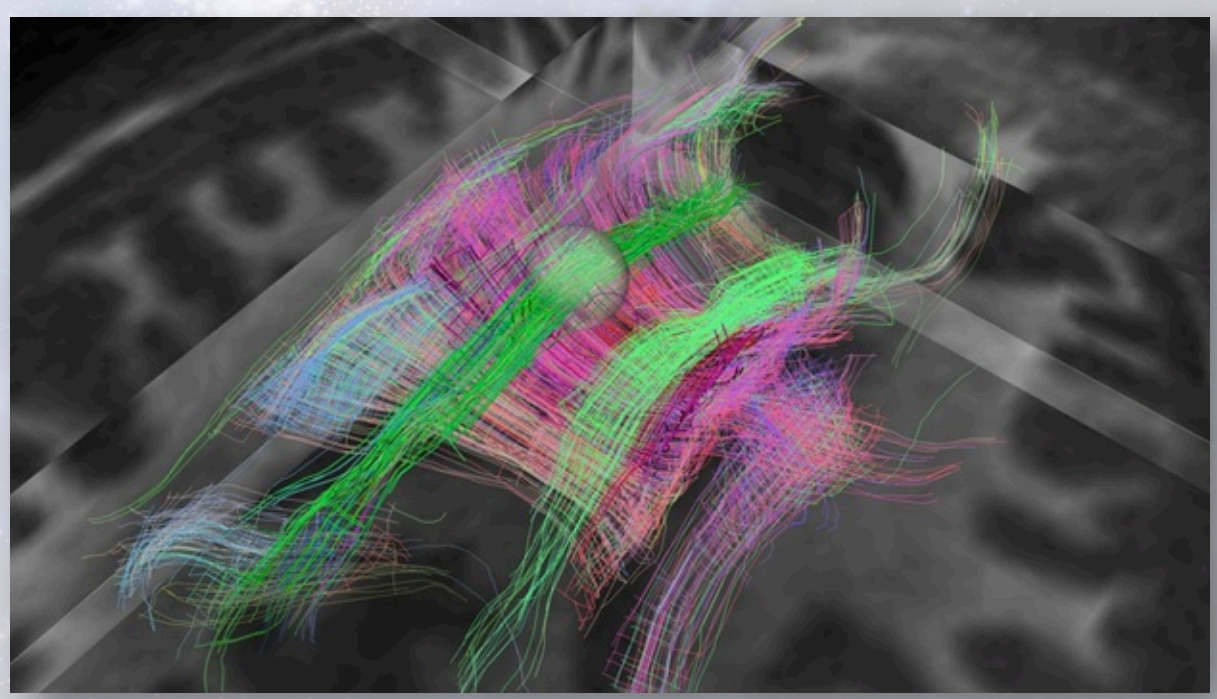
Cross-cutting Initiatives





Research at the Interface of Physical and Life Sciences

Biology Mathematical and Physical Sciences (BioMaPS)



Magnetic Resonance Image (MRI) of *in vivo* grid of cingulum bundle (green) and callosum (red)

Research at the Interface of Physical and Life Sciences

Biology Mathematical and Physical Sciences (BioMaPS)

- Accelerated understanding of biological systems
- New mathematical and physical concepts:
  Renewable fuels, bio-based materials, bio-inspired sensors
- Partnership of MPS with Directorates for Biology (BIO) and Engineering (ENG)

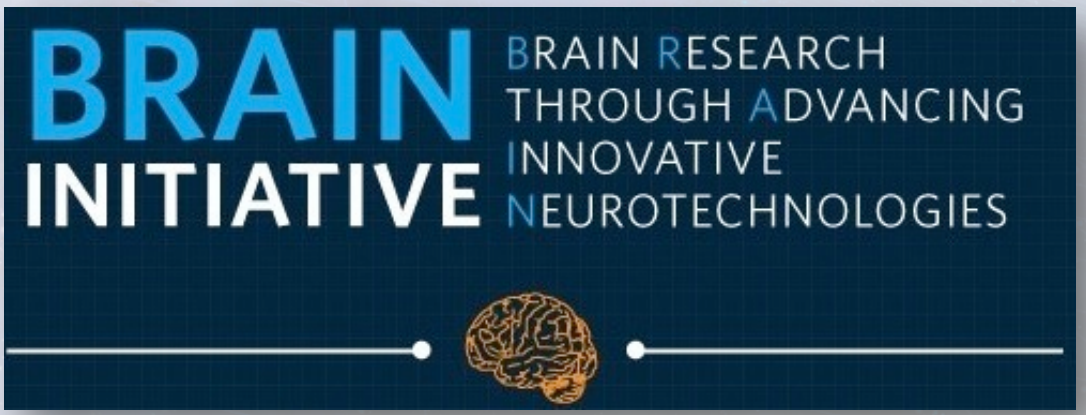
Research at the Interface of Physical and Life Sciences

Neuro and Cognitive Sciences

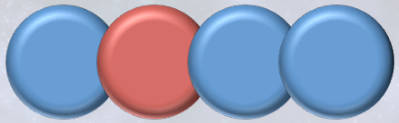
- Partnership of MPS with Directorates for Biology (BIO) and Engineering (ENG) and Social, Behavioral, and Economic Sciences (SBE)

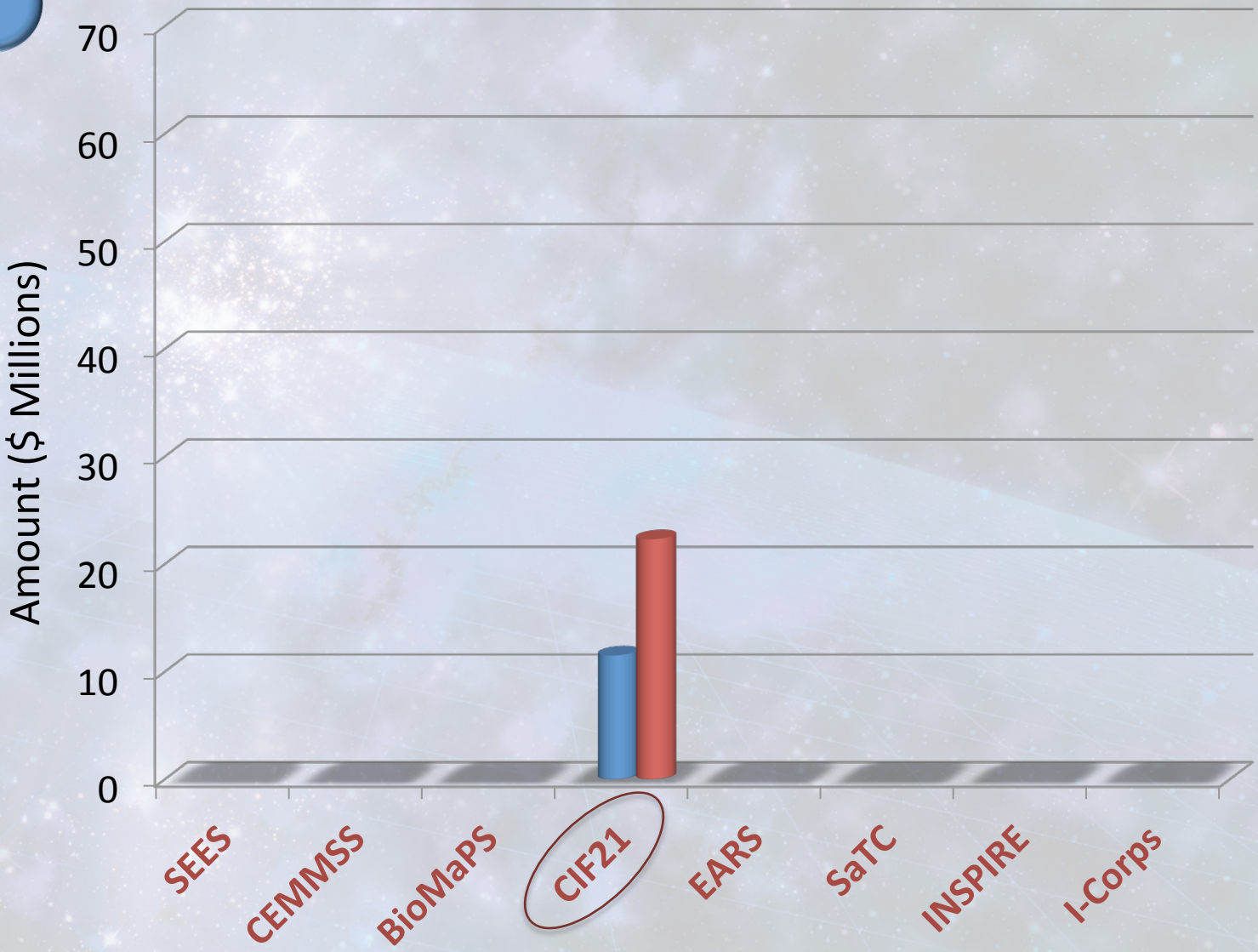
- Tools to understand brain function

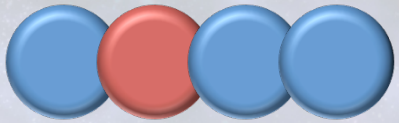
- BRAIN Initiative



Cross-cutting Initiatives







Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21)

(All Directorates)

- Computational and Data Enabled Science and Engineering (CDS&E)
  (Scope growing – MPS, ENG, CISE)

- Core technologies, tools, and algorithms

- "Big data" projects

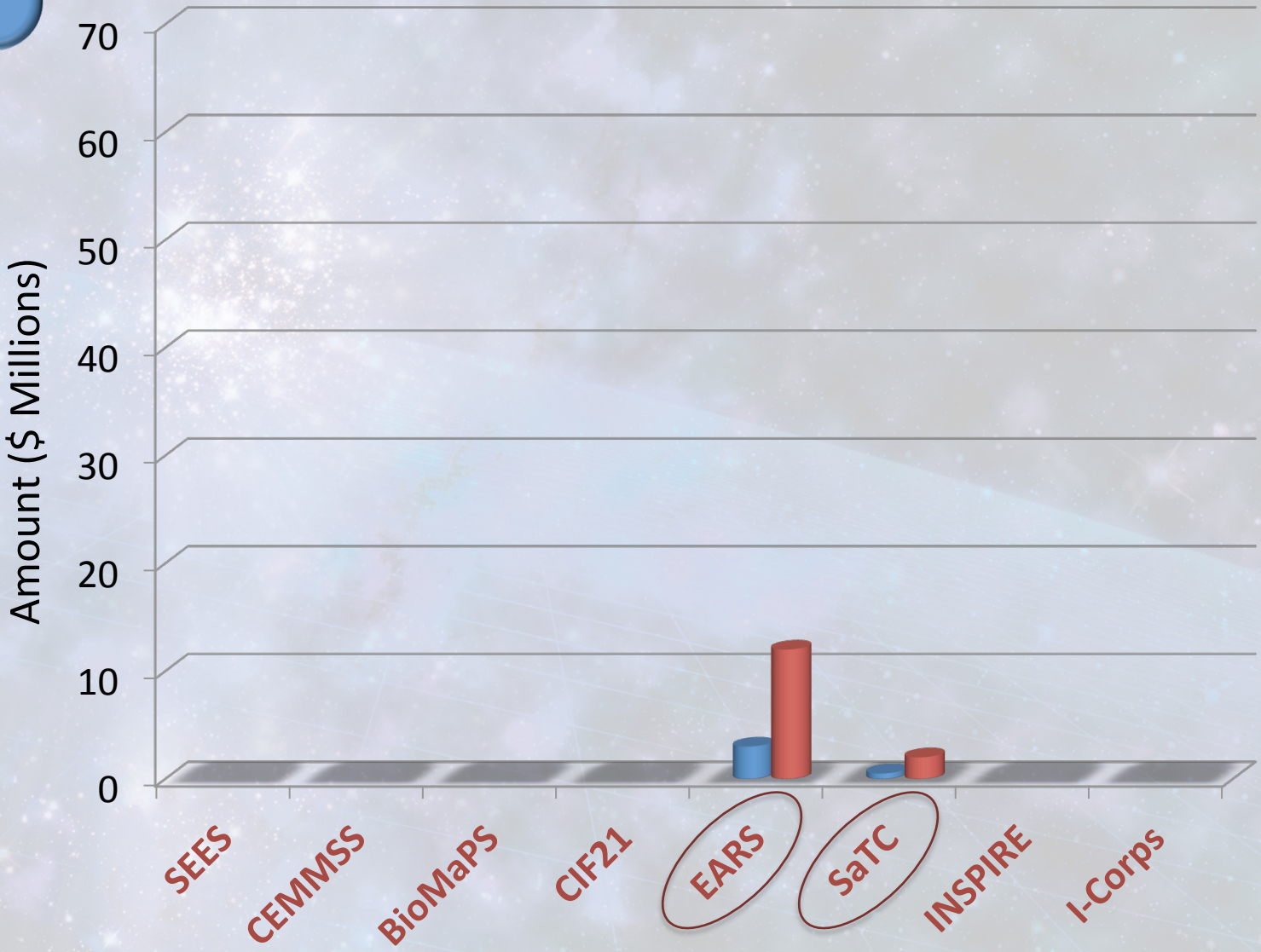
- Workforce development

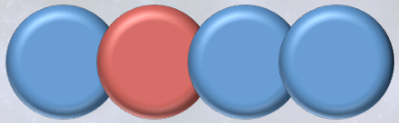
$ 22 M

91%

$ 11.5 M

Cross-cutting Initiatives

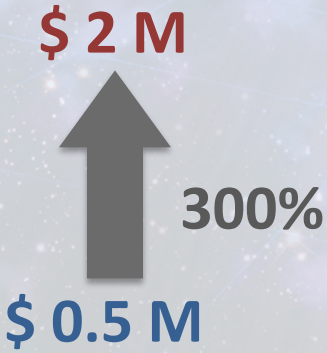




Enhancing Access to the Radio Spectrum (EARS)

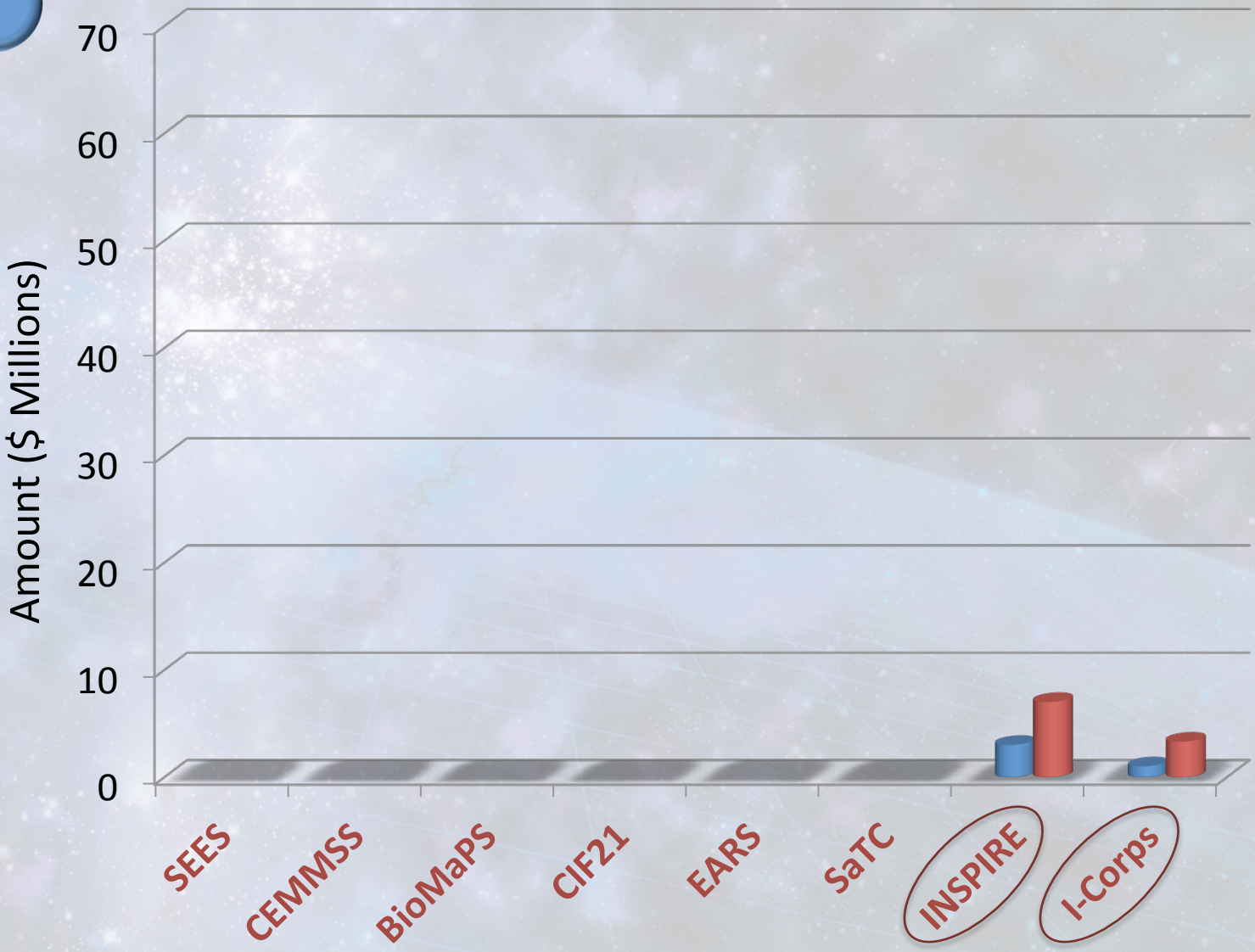
- Radio frequency mitigation, materials, design, and mathematics
- Policy foundations of spectrum management
- Partnership among Directorates (MPS, ENG, CISE, and SBE)

Secure and Trustworthy Cyberspace (SaTC)



- Research to keep nation's transactions confidential and secure
- Comprehensive Cybersecurity Initiative
- Partnership of MPS with CISE

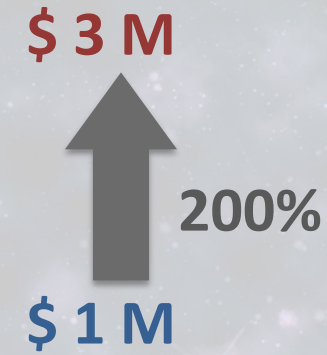
Cross-cutting Initiatives



Supporting Multidisciplinary Research Across the Foundation

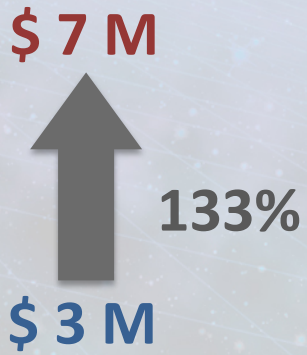
Innovation Corps (I-Corps)

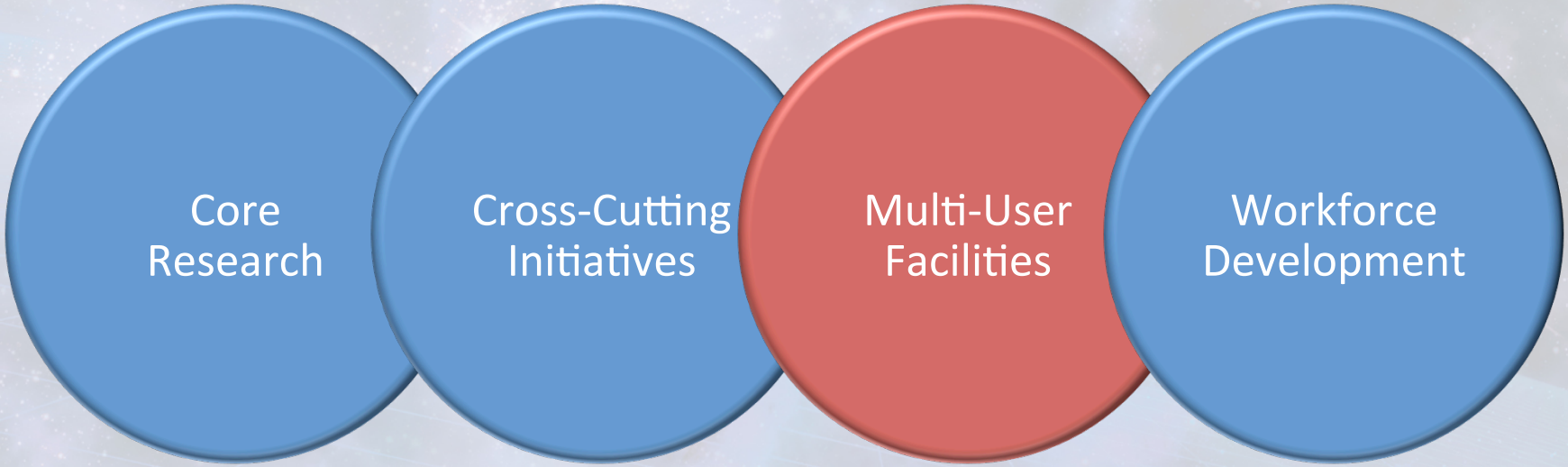
- Stimulate innovative entrepreneurial partnerships including graduate students



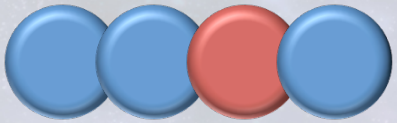
Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE)

- Transformative, high-risk multidisciplinary research




Core Research
Cross-Cutting Initiatives
Multi-User Facilities
Workforce Development

Multi-User Facilities



Forefront Facilities

Astronomy (AST)

Advance Technology Solar Telescope (ATST)

Arecibo Observatory

Atacama Large Millimeter Array (ALMA)

Gemini Observatory

Large Synoptic Survey Telescope (LSST)

National Optical Astronomical Observatory (NOAO)

National Radio Astronomy Observatory (NRAO)

National Solar Observatory (NSO)

Physics (PHY)

Ice Cube Neutrino Observatory

Large Hadron Collider (LHC)

Laser Interferometer Gravity-wave Observatory (LIGO)

National Superconducting Cyclotron Laboratory (NSCL)

Materials Research (DMR)

Cornell Higher Energy Synchrotron Source (CHESS)

National High Magnetic Field Laboratory (NHMFL)

National Nanotechnology Infrastructure Network (NNIN)

$ 285 M

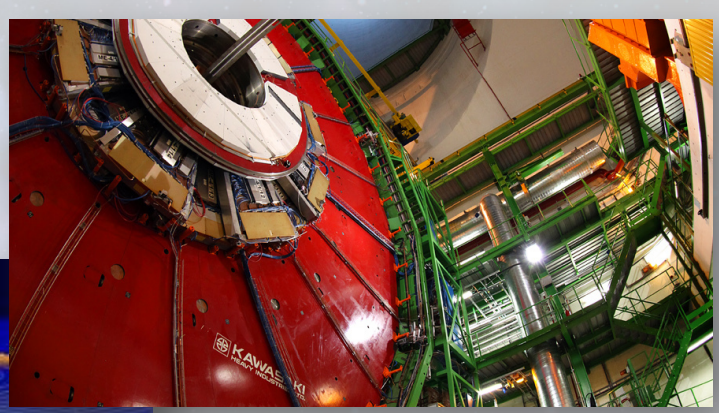
8%

$ 265 M

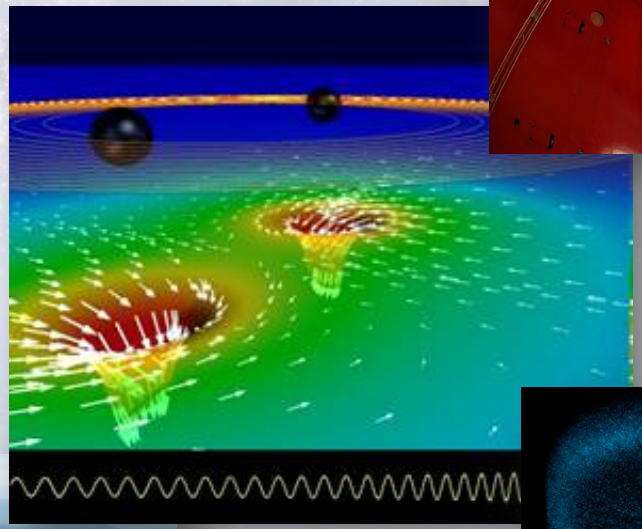
Multi-User Facilities

Forefront Facilities

CMS Detector at LHC



LIGO Simulation

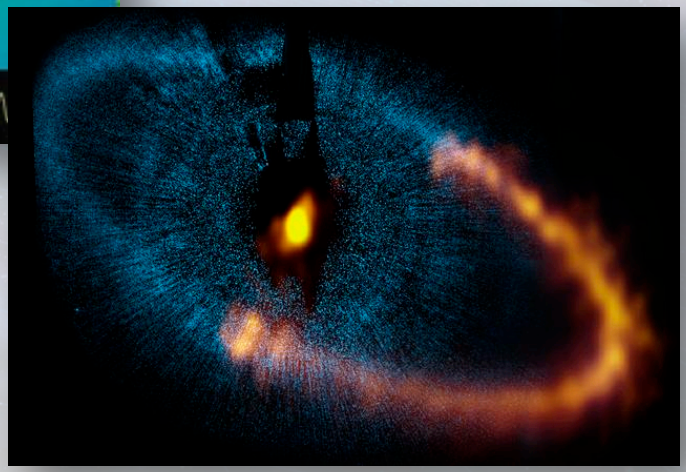


$ 285 M

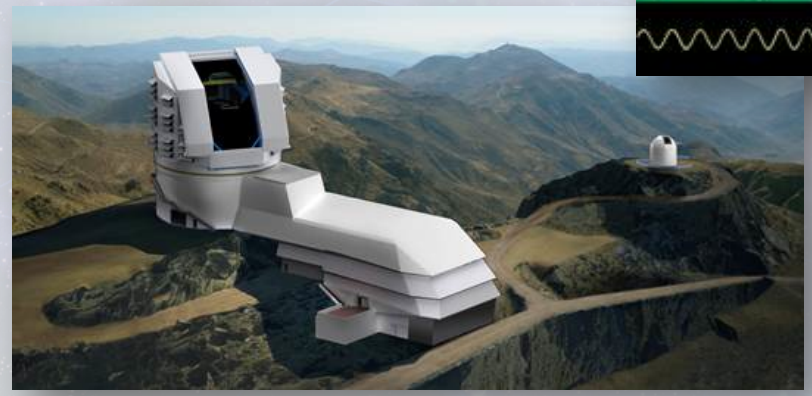
8%

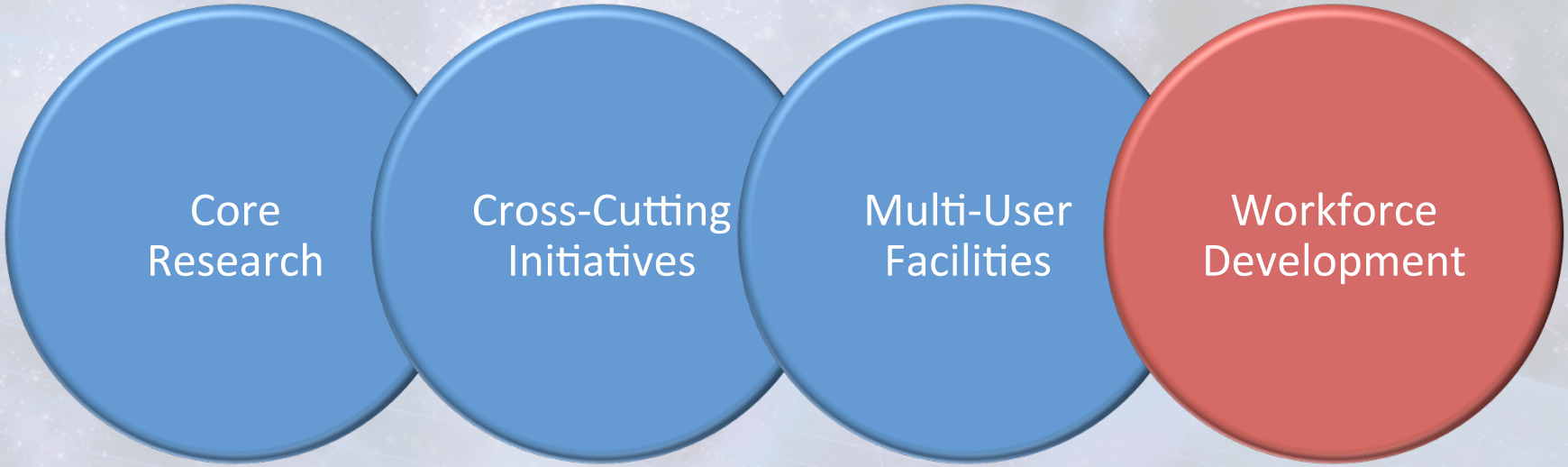
$ 265 M

ALMA Data



LSST Design




Core Research
Cross-Cutting Initiatives
Multi-User Facilities
Workforce Development

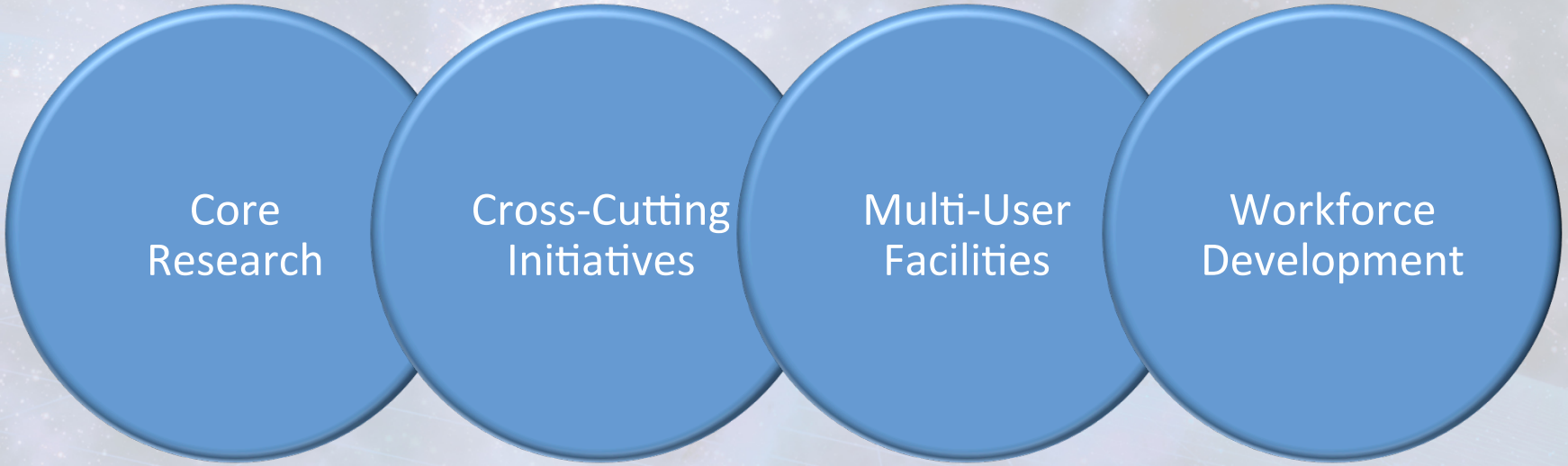
Building the STEM Pipeline: MPS Core Programs

CAREER

- Young teacher - scholars
- Variety of implementations:
  Development award or honor for exceptional young faculty
- 130 awards planned for FY 2014

Alliances for Graduate Education and the Professoriate (AGEP)

- Supplements to existing MPS grants to support under-represented minority graduate students
- Partnership of MPS with Directorate for Education and Human Resources (EHR)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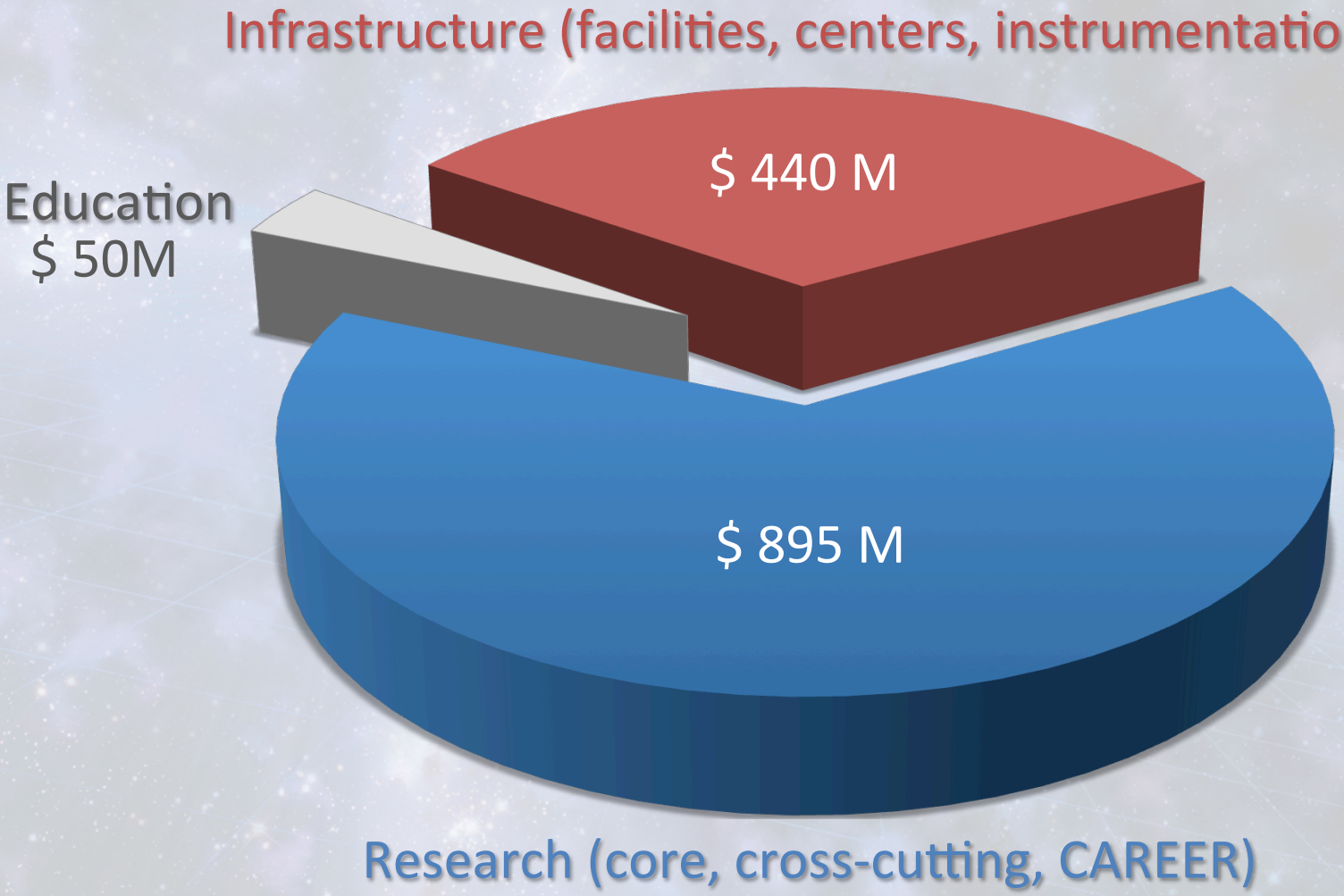
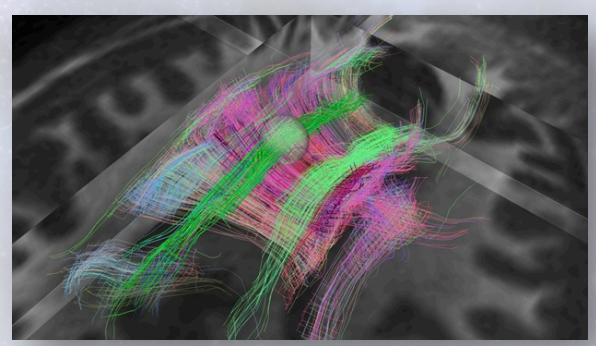
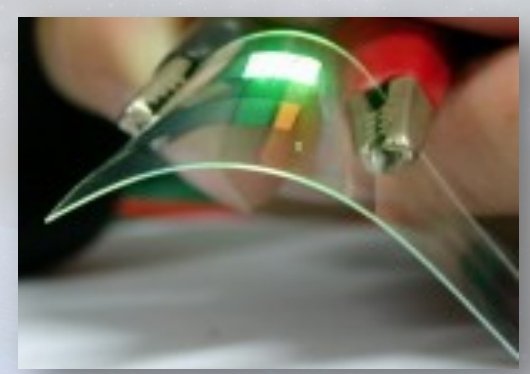
Mathematical and Physical Sciences (MPS)





Directorate for Mathematical and Physical Sciences (MPS)

- Advancing Discovery



- Building Blocks for Innovation
- Forefront Facilities

- Educating the Next Generation